

Claims

Please cancel claim 20. Please amend claims 1, 6, 7, 8, 13, 14, and 17 as follows:

1. (Currently Amended) A method of programmatically controlling a service of a logical device realized on a first computer from software programs running on a second computer, the method comprising:

from the first computer, obtaining at the second computer a service description message related to the service, the service description message detailing a service state table including at least one property associated with the service and a set of actions that can be invoked on the service via network data messages conveyed to the first computer via peer-to-peer networking connectivity over a data communications network connecting the first and the second computer, the set of actions comprising at least one action previously not available for invocation by the software programs running on the second computer;

based on the service description message, creating a service object corresponding to the service, the service object exposing a programming interface to access by software programs running on the second computer, the programming interface ~~having~~ comprising an action-invoking member for invoking the set of actions listed in the service description including the at least one action previously not available for invocation by the software programs running on the second computer;

based on the service description message, converting a programmatic invocation of the action-invoking member of the programming interface by a software program running on the second computer into a network data message for invoking [an] one or more of the set of actions of the service via peer-to-peer networking connectivity over the data communications network; and

transmitting the network data message to the first computer to thereby invoke the one or more of the set of actions of the service.

2. (Original) The method of claim 1 wherein the network data message for invoking the action is a mark-up language text message.

3. (Original) The method of claim 1 wherein the programming interface is an object integration interface according to an object-oriented programming model.

4. (Original) The method of claim 3 wherein the programming interface is a run-time dispatching interface.

5. (Original) The method of claim 1 wherein the action-invoking member accepts an invocation parameter indicating the action of the service that is to be invoked.

6. (Currently amended) The method of claim 1 wherein the programming interface further has a service state-querying method member, the method further comprising:

responsive to programmatic invocation of the service state-querying method member by the software programs running on the second computer, obtaining state data of the service via peer-to-peer networking connectivity over the data communications network;

updating the service state table; and

returning the state data to the invoking software program.

7. (Currently amended) The method of claim 1 wherein the programming interface further has a service state-querying method member that accepts an invocation parameter indicative of a state data variable of the service, the method further comprising:

responsive to programmatic invocation of the service state-querying method member by the software programs running on the second computer, obtaining a value of the state data variable of the service via peer-to-peer networking connectivity over the data communications network;

updating the service state table with the obtained value; and

returning a datum indicative of the value of the state data variable to the invoking software program.

8. (Currently Amended) In a networking environment providing peer-to-peer connectivity between logical devices on separate computing machines on a data communications network in accordance with a control protocol, ~~the control protocol defining an exchange between a control point and a controlled logical device service in which the controlled logical device service furnishes a service description document to the control point, the service description document specifying a set of actions invocable on the controlled logical device service via peer networking data messages, the~~

~~control point transmitting the peer networking data messages to the controlled logical device service to cause respective actions to be performed,~~ a user-operated control device comprising:

a rehydrating module operable for:

receiving the control protocol defining an exchange between a control point and a controlled logical device service in which the controlled logical device service furnishes the control protocol to the control point in a service description message, the service description message specifying a set of actions invocable on the controlled logical device service, the set of actions comprising at least one action previously not available for invocation by the control point; and

the rehydrating module further operable for creating a service object for exposing an application programming interface based on the service description message for invoking set of actions specified in the service description message including the at least one action previously not available for invocation by the control point;

[an] the application programming interface exposed by the rehydrating module to access from application software running on the user-operated control device, the application programming interface having an invoke action member operable for invoking the set of actions specified in the service description message including the at least one action previously not available for invocation by the control point; and

invoke action member-implementing code of the rehydrating module operating responsive to an invocation of the invoke action member to generate a peer networking data message to cause the controlled logical device service to perform a respective action of the controlled logical device service; and

~~service description obtaining code of the rehydrating module operating to obtain the service description document from the controlled logical device service per the control protocol; and~~

converting code of the rehydrating module operating to construct the peer networking data message based on the control protocol obtained via the service description document message.

9. (Canceled)

10. (Original) The user-operated control device of claim 8 wherein the application programming interface is an object integration interface conforming to an object-oriented programming model.

11. (Previously Amended) The user-operated control device of claim 10 wherein the application programming interface is a run-time method invocation dispatching interface.

12. (Original) The user-operated control device of claim 8 wherein the peer networking data message is a mark-up language text message.

13. (Currently amended) A computer-readable data carrying medium having software program code carried thereon, the software program code comprising:

a programmatic peer networking device service control module providing programmatic control of logical device services on a computing device by application software running on a different computing device ~~executing the software program code of logical device services of separate computing devices~~ on a data communications network via a peer-to-peer networking connectivity service control protocol;

an application programming interface for access by the application software, the application programming interface exposed by a service object created based on a service description message comprising a set of actions invocable on the logical device services , the service object created by the programmatic peer networking device service control module ~~for access by the application software,~~ the application programming interface being a run-time dispatch interface having an invoke service action method member, the invoke service action method member accepting an action identifier, ingoing action arguments, outgoing action arguments, and action return value as parameters upon invocation by the application software, wherein the action identifiers, the ingoing action arguments, the outgoing action arguments and the action return values correspond to those of the set of actions specified in the service description message and are specified therein, the set of actions including at least one action not available for invocation by application software previous to the creation of the service object; and

invoke service action method member-implementing code of the programmatic peer networking device service control module operating responsive to an invocation of the invoke service action method member on the application programming interface by the application software to exchange data messages with a logical device service of a separate computing device on the data communications network in accordance with the peer-to-peer networking connectivity service control protocol so as to invoke an action of the logical device service including the at least one action not available for invocation by application software previous to the creation of the service object as per the parameters of the invoke service action method member and pass outgoing action arguments and action return value from the logical device service back to the application software.

14. (Currently amended) The computer-readable data carrying medium of claim 13 wherein the software program code further comprises:

service description requesting code of the programmatic peer networking device service control module operating to obtain a service description of the logical device service via an exchange of data messages with the logical device service of the separate computing device on the data communications network in accordance with the peer-to-peer networking connectivity service control protocol, ~~the service description specifying the action identifier, and action arguments of the action of the logical device service.~~

15. (Original) The computer-readable data carrying medium of claim 14 wherein the software program code further comprises:

service control data messaging code of the programmatic peer networking device service control module operating based on the service description to construct the data messages for exchange with the logical device service in accordance with the peer-to-peer networking connectivity service control protocol to invoke the action of the logical device service.

16. (Original) The computer-readable data carrying medium of claim 15 wherein the data messages for exchange with the logical device service are mark-up language text messages.

17. (Currently amended) A software module carried on a tangible computer-executable software carrying medium, the software module operable for:
providing programmatic control of a logical device running on a computing device by an application software on a different computing device over a data communications network by exposing a programming interface for providing programmatic logical device service control via peer networking connectivity, the programming interface comprising:
an invoke action method member having parameters for passing an action identifier, action arguments and action return value;
wherein an implementation of the invoke action method member in the software module converts an invocation of the invoke action method member into an exchange of text messages with [a] the logical device via peer networking connectivity based on a service description obtained from the logical device to control a service of the logical device; and
a logical device state call back method member having parameters for passing a reference to a call back interface for reporting change of the logical device's state to other registered devices on the network.

18. (Original) The software module of claim 17 wherein the programming interface further comprises a state variable querying method member having parameters for passing a state variable identifier and state variable value relating to a logical device state variable.

19. (Original) The software module of claim 17 wherein the programming interface further comprises a service type querying method member having parameters for returning a type identifier relating to a service of the logical device.

20. (Canceled)

21. (Original) The software module of claim 17 wherein the programming interface further comprises status method members having parameters for returning a value indicative of a status of controlling the service of the logical device.

22. (Original) The software module of claim 17 wherein the programming interface is an object integration interface conforming to an object-oriented programming model.

23. (Original) The software module of claim 17 wherein the programming interface is a run-time method invocation dispatching interface.